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ABSTRACT

This report considers evidence for tracking of indicators of physical activity during childhood and adolescence, the transition from adolescence into adulthood, and adulthood. Tracking refers to the tendency of individuals to maintain their rank or position within a group over time. Longitudinal data for at least two points in time are necessary. Presently available data are from longitudinal studies which include an indicator of physical activity. The issue of tracking or stability is inherent in longitudinal studies. Three studies of combined samples of boys and girls provide the only information for childhood. Data are more available for boys and girls followed from late childhood into adolescence. Data tracking indicators of physical activity within adulthood are most available for the short term and are derived from follow-up studies of adolescents. Several studies have asked adults to recall their activity histories during adolescence and young adulthood, then related these estimates to present physical activity levels. The research suggests significant, moderate to low interage correlations for a variety of indicators of physical activity from childhood through adulthood. The report concludes that physical activity is a biocultural behavior, with individuals expending energy or applying ground reactions forces in movement behaviors that occur within a cultural context. (Contains 40 references.) (SM)

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Research Digest
Tracking of Physical Activity Across the Lifespan

President's Council on Physical Fitness and Sports

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President's Council on Physical Fitness and Sports

Research Digest

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Tracking of Physical Activity Across the Lifespan

Introduction

Calls for increasing physical activity on a regular basis in all segments of the population from early childhood through old age are central to public health policy. Regular physical activity has a positive influence on health during childhood, adolescence, and throughout adult life. A lifestyle of regular physical activity contributes to weight maintenance, more efficient function of various systems, reduced risk of several degenerative diseases and mortality, and overall improvement of quality of life.[1] Potential relationships between physical activity in childhood and adolescence, and health, operationalized in the context of health-related physical fitness and selected indicators, e.g., obesity, bone mineral, etc., during childhood, adolescence and adulthood have been previously reviewed.[2]

Public health objectives are predicated on the assumption that physical activity will become habitual—a regular component of the daily activities of all individuals. This in turn assumes that physical activity will track, i.e., will be a stable aspect of behavior. This review considers evidence for tracking of indicators of physical activity during childhood and adolescence, the transition from adolescence into adulthood, and during adulthood. It builds upon earlier reviews.[2,3]

What Is Tracking?

Tracking refers to the tendency of individuals to maintain their rank or position within a group over time. Longitudinal data for at least two points in time are necessary, and interage correlations (Pearson or rank order) between the repeated measurements are used most often to estimate tracking. In general, the closer the time span between measurements, the higher the correlation; as the interval increases, interage correlations generally decline. Other factors which influence correlations include age at first observation, short term biological variation, major environmental change, and measurement variability. The following is a suggested guide to the interpretations of correlations: <0.30, low; 0.30 to 0.60, moderate; >0.60 moderately high. The ranges are, of course, arbitrary. Correlations only indicate the relationship between the two measurements; they indicate nothing about cause-effect or determining factors.

Other approaches to tracking use percentiles, risk analysis, and linear models.[4] Percentile analysis focuses on maintaining a given rank over time, e.g., active (highest quartile), moderately active (second quartile), moderately inactive (third quartile), and inactive (lowest quartile). Risk analysis emphasizes the probability (risk or odds) of maintaining a specific characteristic (e.g., active vs inactive, fit vs unfit, overweight vs non-overweight) over time. Linear models use all data points for individuals, adjust for unequally spaced intervals, and can account for missing values in a single analysis. Some linear models distinguish measurement variation (reported level of physical activity) from change in physical activity by adjusting for the reliability or unreliability of the indicator of physical activity. Applications of such models to indicators of physical activity are relatively recent.

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Sources of Data

Presently available data are from longitudinal studies which include an indicator of physical activity—studies of growth and maturity, changes in risk factors for cardiovascular disease (lipids, blood pressures) during childhood, adolescence and/or adulthood, and changes in lifestyle during adulthood. The issue of tracking or stability is inherent in longitudinal studies. Studies considered in this review span an interval of at least three years (with one exception during childhood). The discussion first describes specific studies and indicators of physical activity, and then addresses the issue of tracking in different stages of the life cycle.

Childhood

Three studies of combined samples of boys and girls provide the information for childhood. This reflects the difficulty in obtaining reliable estimates of activity at young ages. Physical activity was quantified as the percentage of time that heart rate was ≥ 50% of resting heart rate between 3 and 6 p.m. in children followed from 3 to 6 years,[5] and monitored by direct observation at home and during recess in children from 4 to 6 years of age.[6] Among children observed at two year intervals from 6 to 12 years, three

indicators of physical activity were used: teacher ratings, total energy expenditure (EE) based on 4-hour heart rate during a school day, and energy expenditure >50% of aerobic power (more intense activity).[7] Interage correlations for the three studies are shown in Figure 1. Values vary among studies and with indicators of activity, and decline with longer intervals. They indicate low to moderate tracking of physical activity during childhood. Among children followed longer intervals (4 to 6 years), interage correlations for more intensive activity are low compared to those based on teacher ratings and total EE.

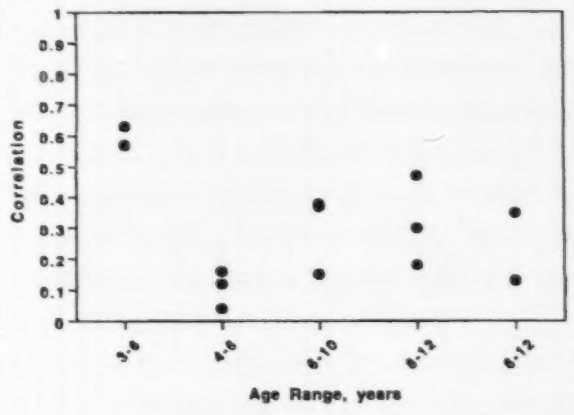

Figure 1.

Interage correlations for indicators of physical activity during childhood, sexes combined.

Adolescence and the Transition into Adulthood

Data are more available for boys and girls followed from late childhood into adolescence (transitional years, approximately 9-12 years), during adolescence, and from adolescence into young adulthood (21-35 years). Data from the study of Cardiovascular Risk in Young Finns are comprehensive.[8,9,10] Cohorts of males and females, 9, 12, 15, and 18 years of age, were followed at three year intervals for 9 to 12 years from 1980 to 1992 when they were 21, 24, 27 and 30 years, respectively. Physical activity was based upon a short questionnaire which focused on leisure time activity and sport, intensity (breathing and sweating), and frequency of physical activity and sports club training and competitions. Interage correlations for the overall physical activity index are summarized in Figure 2. Correlations are generally moderate, but reach low levels at some ages. Correlations are highest for three year intervals and decline as intervals increase. However, there is variation within intervals. For intervals of 3 and 6 years, interage correlations for the physical activity index are higher in males than in females and tend to increase with age at first observation, e.g., they are higher for the interval from 18 to 21 or 18 to 24 years than for the interval from 9 to 12 or 9 to 15 years. Of course, the age range 9-15 years includes the adolescent growth spurt and sexual maturation, associated changes in behavior and interests, including interests in sport and physical activity, and the transition from elementary to secondary school. The age range 18-24, on the other hand, marks the transition from secondary school to the work force and/or university and perhaps in social status. Interage correlations for the physical activity index are lowest for the 12 year interval, but are similar for the intervals 12-24, 15-27 and 18-30 years, about 0.2 to 0.3. Sex differences are reduced and/or variable.

The Finnish study also permits evaluation of the frequency of physical activity and sport club training and intensity of physical activity. Interage correlations for frequency (Figure 3) are lower than corresponding correlations for the physical activity index (Figure 2), but those for the intensity (Figure 4) are generally similar to correlations for the index. Although there is overlap, interage correlations for frequency and intensity of physical activity tend to be lower in females than in males. This tendency is more apparent for longer intervals. Note that the upper ages are those in which childbearing and rearing may be a significant factor affecting physical activity habits of women. Interage correlations for intervals beginning at 18 years (i.e., the transition into adulthood) tend to be higher than those for the younger cohorts.

Interage correlations for frequency of sports club training (Figure 5) tend to be higher than corresponding correlations for the frequency and intensity of physical activity and the activity index. For three year intervals, correlations for the frequency of sports club training increase with age; they range from 0.49 to 0.71 in the 18-21 year cohorts. Consistent with other indicators, correlations decline with interval length. For the 9 year interval, interage correlations for frequency of sports club training are higher in males than in females and increase with age at first observation. The sex difference is small for the interval 9-18 years, but is subsequently magnified due to the decline in the interage correlation for females in the interval 12-21 years. Subsequently, interage correlations increase for the intervals 15-24 to 18-27 years.

Several studies include the adolescent years per se and variable intervals spanning an adolescent age and young adult ages. The Muscatine Study of cardiovascular risk factors includes

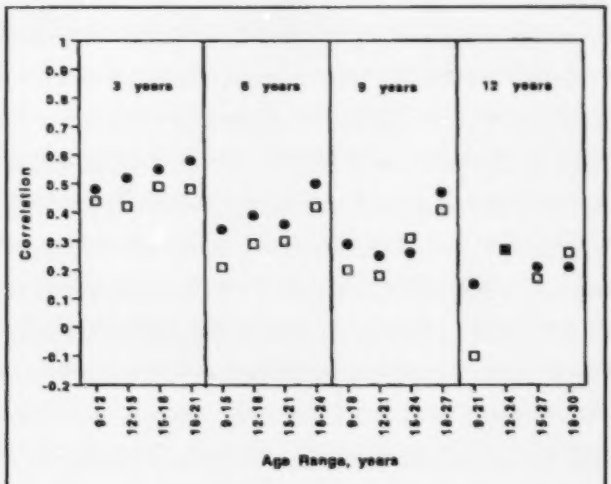

Figure 2.

Interage correlations for a physical activity index during adolescence and into young adulthood: Cardiovascular Risk in Young Finns study. Filled circles are values for males and open squares are values for females.

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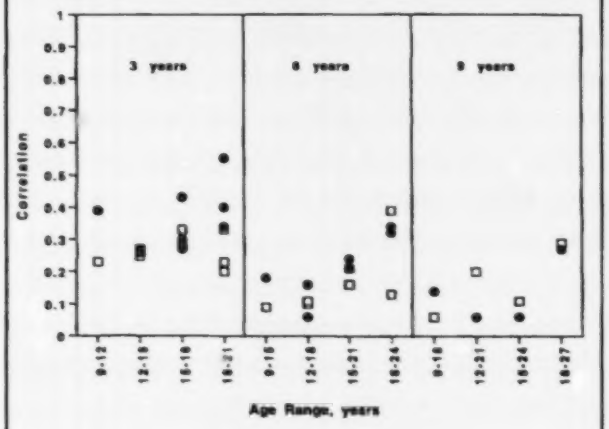

Figure 3.

Interage correlations for frequency of physical activity during adolescence and into young adulthood: Cardiovascular Risk in Young Finns study. Filled circles are values for males and open squares are values for females.

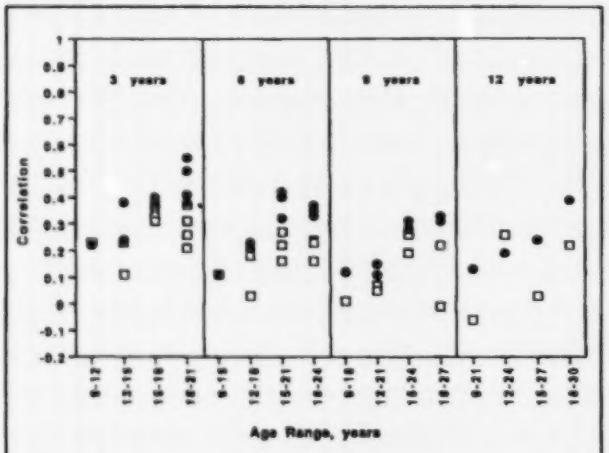

Figure 4.

Interage correlations for intensity of physical activity during adolescence and into young adulthood: Cardiovascular Risk in Young Finns study. Filled circles are values for males and open squares are values for females.

questions on physical activity (number of episodes of sweating or breathing hard due to physical activity over three days) and inactivity (television viewing and video games) for youth about 10 through 14 years.[11] Two major European longitudinal studies provide unique data on growth, maturity, fitness and physical activity during adolescence and in young adulthood, the Leuven Growth Study of Belgian Boys[12,13] and the study of Growth and Health of Teenagers in Amsterdam.[14] Both studies include measures of growth, maturity, performance, fitness and physical

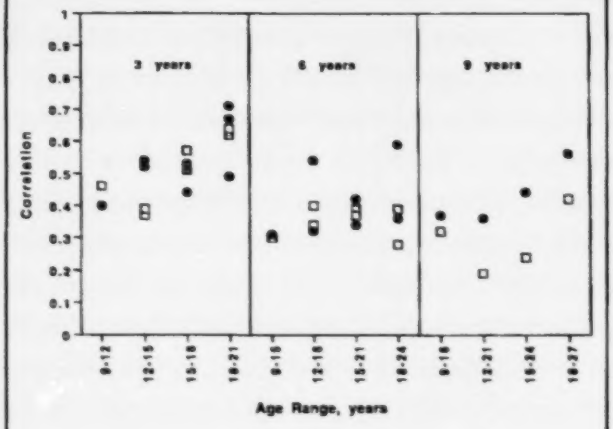

Figure 5.

Interage correlations for frequency of sports club training during adolescence and into young adulthood: Cardiovascular Risk in Young Finns study. Filled circles are values for males and open squares are values for females.

activity. In the Belgian study, physical activity was assessed as a sports participation score (hours per week over the entire year) based on a standardized questionnaire and verified by personal interviews from 13-18 years, whereas in the Dutch study, physical activity was estimated as habitual activity per week (duration and intensity) and energy expenditure in organized sports from 13-16 years based on structured interviews. Both studies also include adult follow-up components—at 30, 35, and 40 years in Belgian males[15,16] and at 21 and 27 years in Dutch males and females.[17,18] More recently, activity assessments in the Amsterdam study were partitioned in terms of peak strain (jumping, weight-bearing, etc.) in the context of physical activity and bone health.[19]

In the context of risk factors for cardiovascular disease, physical activity and fitness were monitored in a sample of Danish school youth 15-19 years at baseline and then 8 years later. Physical activity was recorded as hours of sport activities per week.[20] Physical activity and fitness were also monitored in a sample of Swedish adolescents 15-18 years, and then health-related behaviors including physical activity were assessed 18 years later at 33-36 years.[21] Finally, a sample of the Canada Fitness Survey, 11-69 years, was followed up 7 years later. Estimated physical activity, based on a questionnaire, was expressed as daily time spent in physical activity regardless of intensity and activity energy expenditure associated with daily leisure activities.[22]

Interage correlations for indicators of physical activity from the six studies span a range from 3 to 22 years, including the adolescent years and an adolescent age and several young adult ages (Figure 6). Correlations for indicators of activity spanning 3-4 years during adolescence are moderately high, and in contrast to the Finnish study, are higher in females than in males. Interage correlations decline with increasing intervals (5 to 8 years). They are moderate for the 5 year interval, but generally low for the 7-8 year intervals. There are no consistent

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sex differences. There is considerable variation among studies, which probably reflects sampling variation and differences in indicators of physical activity.

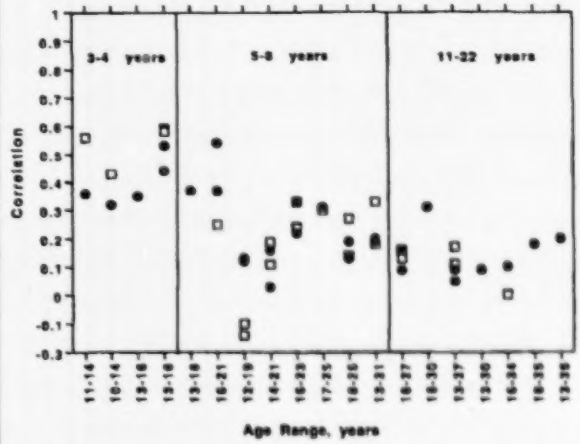

Figure 6.

Interage correlations for indicators of physical activity during adolescence and into young adulthood in several studies. Filled circles are values for males and open squares are values for females.

Interage correlations for physical activity over longer intervals (11-22 years), including an adolescent age and 27-35 years, overlap those for 7-8 year intervals spanning an adolescent age and 21-25 years. They are generally low but several interage correlations approach moderate levels. In the Amsterdam sample, interage correlations for physical activity based on energy expenditure in organized sports are slightly higher than those for weekly habitual physical activity during adolescence and from adolescence into young adulthood (16-21 years) in boys.[17]

The studies of Finnish, Belgian and Amsterdam youth also included more complex models to estimate tracking. Estimates for intervals from adolescence into young adulthood (12 to 15 years) tend to be higher than those based on interage correlations, but are still in the moderate range.[9,15,23]

Adulthood

Data tracking indicators of physical activity within adulthood (20+ years) are most available for the short term, 3 to 7 years. The data are derived from follow-up studies of adolescents: at 3, 6, and 9 year intervals in the Cardiovascular Health of Young Finns study when the cohorts were in their 20s,[8,9,10] at 30, 35 and 40 years in the Leuven study,[14,15] at 21 and 27 years in the Amsterdam study,[17] and after 7 years in adults in the Canada Fitness Survey.[22] A survey of lifestyle behaviors, including an index of physical exercise, of adult men in the Netherlands, 30-70 years at baseline, spanned 4 years.[24] The CARDIA study (Coronary Artery Risk Development in Young Adults) in four United States communities surveyed adults of both sexes, 18-30 years at baseline, after an interval of 7 years. A score for moderate and vigorous activities, based on interview, was used.[25] The ongoing study of Harvard College alumni (males, mean age of 43 years at initial follow-up in 1962-1966) included subsequent observations in 1977 and 1988 (11-26 years). Physical activity was assessed in the context of climbing stairs, number of blocks walked and sport/recreation activities, and was expressed as weekly energy expenditure.[26]

Adult data are more available for males than females (Figure 7). Variation among interage correlations for indicators of activity for intervals of 3-6 years within the 20s and overlap between males and females are considerable. Correlations range from low to high, and correlations for 3 year intervals tend to be higher than those for 6 year intervals. Short-term interage correlations (4-5 years) tend to decrease with increasing age.

Over 7 year intervals in adulthood, interage correlations for physical activity range from low to moderate with considerable overlap between values for males and females. Correlations decrease with increasing age at baseline to 40-49 years; values for older ages at baseline are more variable. When observations are extended across intervals of 11 to 26 years in the study of Harvard alumni, the trend is for decreasing interage correlations with longer intervals between observations. Applications of more complex statistical models to estimates of physical activity over rather short intervals at different ages in adulthood indicate higher estimates of stability in the moderate range.[9,15]

Historical Physical Activity

Several studies have asked adults to recall their activity histories during adolescence and young adulthood (level of participation in activities and sport, competence) and then related these estimates to present levels of physical activity.[21,27,28] Historical estimates of physical activity have limitations, largely related to accuracy of recall. For example, a sample of males was interviewed at 14 years about family and social relationships and several adolescent activities, and then were interviewed about the same contexts at 48 years of age. Accuracy of historical memory dealing with relationships and specific activities approached chance levels, with one exception, the item concerning sports— "Do (did) your parents encourage you to be

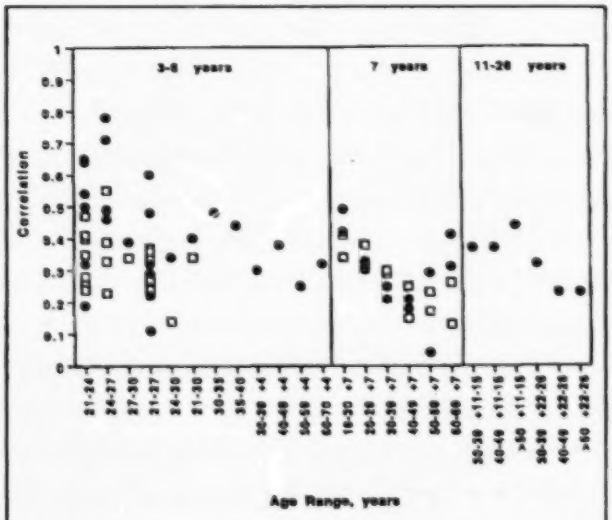

Figure 7.

Interage correlations for indicators of physical activity within adulthood. Filled circles are values for males and open squares are values for females.

active in sports?" The percentage of concordant answers at 14 and 48 years was 68%.[29]

To facilitate historical recall of physical activity, a "cognitive interview" has been used.[30] The protocol is based on principles of cognitive psychology. The individual is initially asked to review photographs from the time when he/she was an adolescent (context reinstatement). This is followed by a detailed interview regarding weekly life cycle, use of imagery to recall activities during the time period in question, detailed narratives of activities, and so on, followed by a standardized series of short-answer questions. Illustrations of typical activities at younger ages have also been used to facilitate recall.[31] Although not historical recall, teacher ratings of activity levels in adolescence provide a useful record.[32]

Studies using these approaches provide insights into the association between physical activity in adolescence and adulthood, and complement interage correlations. Teacher ratings of proficiency in sport and level of energy at 13 and 15 years, respectively, are related to physical activity at 36 years of age in men and women. Those rated above average in ability in sport and as extremely energetic by their teachers during adolescence were more likely to participate in active leisure pursuits at 36 years of age, with odds ratios of 1.35 for proficiency in sport at 13 years and 1.62 for being extremely energetic at 15 years.[32] Bivariate correlations for sport participation during adolescence (climbing and hiking, skating, bicycling, "engaging in sport," ping-pong, baseball or tennis) and at about 52 years of age (swimming, tennis, golf, jogging, and other like activities) were low in males (0.13) and a bit higher in females (0.25). However, after controlling for health status, education and income, adolescent sport participation was a better predictor of adult sport activity in adult women than in men, whereas the health and social variables were more important predictors of adult sport participation in men.[33] Indicators of childhood and adolescent experiences in physical activity as recalled in a historical questionnaire were weakly correlated with exercise habits in males about 45 years of age, -0.20 to +0.17.[34] The direction of the relationships between childhood and adolescent experiences in physical activity and adult exercise habits, however, suggested potentially important roles for proficiency in motor skills during childhood and adolescence, and for giving youth a voice in the choice of physical activities and sport participation.

Data for older ages are limited. In a study of 76 year old men and women, historically recalled physical activity (weighted scores based on number of activities— competitive and recreational sports, household and occupational activities, transport) for adolescence (10-20 years) and young adulthood (21-35 years) were not related to current activity. As earlier life periods became closer to 76 years, the number of significant correlations between historic activity and present activity increased for men (0.21 to 0.26), but not for women.[27] In both men and women, activity in the period immediately preceding 76 years (66-75 years) was correlated with present activity (0.27 to 0.38). In a study of women 70-98 years of age, current self-efficacy for fitness activities was related to perceived well-being (25% of the variance), movement confidence in childhood (proficiency in six physically challenging "girlhood skills," 22%), and age (10%).[33]

Implications of Tracking Studies

The presently available evidence for samples in the United States and Europe indicates significant, moderate to low interage correlations for a variety of indicators of physical activity from childhood through adulthood. Of the 313 correlations plotted in the figures, 81% fall between 0.10 and 0.49, 9% are between 0.50 and 0.59, and only 3% exceed 0.60. The highest correlations are for frequency of sports club training in Finnish adolescents and young adults, particularly males. Interage correlations in childhood (Figure 1), in adolescence and the transition to young adulthood (Figures 2-6), and within adulthood (Figure 7) show considerable overlap, which suggests some degree of stability of tracking coefficients per se within an age period and across varying intervals. Allowing for factors which influence correlations (see above), lack of control for important covariates, different methods for estimating habitual physical activity, and changes in activity that accompany normal growth, maturation and aging, physical activity (and inactivity) tracks reasonably well.

The higher interage correlations for sport participation scores (Figure 5) suggest that more attention should be given to this context of physical activity in adolescents and young adults. Sport programs in Europe are different from those in the United States. Many European countries have adopted a "sport for all" theme which contrasts youth sport and interscholastic programs in the United States which become quite exclusive (focusing on the elite) during adolescence. As a result sport offerings for youth with lesser skill levels or different interests are rather limited in many communities.

Tracking is a sample characteristic which refers to the tendency of individuals to maintain their rank or position within a group over time. Since a group includes individuals who differ in level of habitual activity, tracking implies that the active stay active, the moderately active stay moderately active, and the inactive stay inactive. In addition, some individuals move from active to moderately active or inactive, or from inactive to moderately active or active. From a public health perspective, however, tracking needs to be both modified and maintained. The goal is to motivate segments of the population that are not active to be active and to motivate those who are active to remain active.

Physical activity protocols have measurement limitations and different indicators are used at different ages. Do activity assessments in childhood measure the same attributes of activity as assessments in adolescence or in adulthood? Characteristics and contexts of physical activity in childhood, adolescence and adulthood are variable. Adjectives used to describe behaviors, including physical activity, may introduce bias. This may be true of adjectives used by parents, teachers and other caregivers for young children, and for adjectives used to describe intensity of activity. Given physiological changes associated with normal growth, maturation and aging, commonly used descriptors of the intensity of activity (mild, moderate, heavy) probably have different meanings at different ages. And from a physiological perspective, does energy expenditure in physical activities have the same impact on the individual at different stages of the life cycle?

Many factors influence physical activity during childhood, adolescence and adulthood. Studies of determinants of physical activity often focus on social (parental attitudes and support, peer groups, socioeconomic status, ethnicity), psychological (self-efficacy, perceptions of barriers, attitudes, perceived competence), and environmental (access to facilities and programs, safety, seasonal variation) variables in children and adolescence.[35] Socioeconomic status, educational background, marital status, occupation and health-related behaviors (smoking, alcohol consumption) are additional determinants in adults.

Biologically related variables are not commonly included among determinants of physical activity. Indicators of growth and maturity status during childhood and adolescence are examples. Individual differences in the timing and tempo of the growth spurt and sexual maturity may have implications for physical activity. The body mass index (BMI) is the only growth-related variable included in several studies, usually as a proxy for fatness, and results are equivocal. The BMI is included more often in studies of adults given the age-associated increase in the index and the increasing prevalence of overweight/obesity.

Indicators of physical fitness are also not ordinarily considered among correlates of physical activity. This is surprising since activity and fitness are related, albeit at low to moderate levels in children and adolescents but at higher levels in adults.[36,37,38] An individual's level of fitness may be an important determinant of physical activity. Does physical activity track at higher or lower levels in the physically fit or unfit?

Determinants or correlates of physical activity, as well as individual differences, need to be considered in studies of tracking. Results of several family and twin studies are compatible with the notion that genetic and/or cultural factors may predispose an individual to be more or less physically active.[39] Some individuals stay active on a regular basis (i.e., those in whom activity tracks well), some are variably active (i.e., those in whom activity tracks poorly), and others are consistently inactive (i.e., those in whom inactivity tracks well). Are there biological, behavioral and/or environmental characteristics unique to individuals in each category? If so, how do such characteristics interact to contribute to an active or an inactive lifestyle, and can they be modified?

The stability or instability of physical activity, i.e., the behaviors that characterize physical activity, is more complex than revealed by interage correlations. Although the correlation between a measure of physical activity at two ages may be low or moderate, it is possible that a relationship operates indirectly or through intervening pathways. What are the intervening or indirect pathways for physical activity? Intervening steps may operate through transitions associated with the lifespan, a series of temporally arranged transitions. These include the transition from early childhood to formal schooling, which includes many socially sanctioned forms of inactivity; the transition from childhood to puberty with its biological and social implications; the transition from school to the work force, which in the United States is characterized by a prolonged adolescence through the college years; marriage and child rearing; and retirement. Superimposed upon these culturally and biologically related transitions, are factors which may influence the transitions or create new ones, for example, a disease or an accident, job changes, sociopolitical events (war, changes in political power, economic downturn, etc.), and natural events (tornado, hurricane, earthquake, flood). And earlier events in the lifespan may condition later events and in turn influence patterns of stability or instability.

Correlations simply indicate a relationship between the past and the present. They do not predict the future and do not establish a cause-effect sequence. Earlier habits of physical activity may predict present levels of activity or risk of inactivity, but they do not predict future levels. What factors influence the stability or instability of physical activity levels? To what extent are changes in pattern of activity related to specific events in the lifespan? And how can such events help to better understand the stability or instability of habitual physical activity in individuals and groups?

Interage age correlations also need to be viewed in the context of lifestyle changes over the past generation or two (a generation is about 25 years). Effects of such changes on adults are probably different from effects on children and adolescents. The influence of lifestyle changes on the younger generation may not show up for 20-30 years, i.e., they take time to develop and may have long term consequences. Lifestyle changes over the past two generations include reduced levels of physical activity (reduced school physical education, occupational activity, activity for transport—walking, cycling), increased television viewing and other forms of inactivity, reduced energy intake but a marked change in eating patterns (fast foods, eating out, change in time of day when maximum energy is ingested), changes in family and community structure (two earner families, single parent families, rearing conditions and styles, safety concerns), among others.

A factor related to lifestyle changes is generational or secular. Middle-aged adults at present were raised under different conditions with different emphases and expectations, including, for example, more on-the-job physical activity, acceptance of smoking, and a primary role for women in child rearing. Their socioeconomic status has also changed considerably. This is perhaps best reflected in the upward mobility of many Americans after World War II so that many adults presently in their 50s and 60s have come from circumstances in which their parents were laborers with minimal formal education. They were generally reared in a physically active lifestyle, but conditions have changed with increased social mobility. How might this impact perceptions and habits of physical activity not only among adults but also in their children?

Cultural variation, associated with our immigration history, is another factor related to lifestyle. Major migrations to the United States occurred at the turn of the 19th to 20th centuries and after World War I. These migrations were largely from Europe, with its core cultural values. Migrations to the United States over the past generation are from different geographic areas, primarily Latin America, the Caribbean and Asia, with variable degrees of acculturation or assimilation. The United States is not the melting pot commonly attributed to its population composition. Cultural values vary among ethnic groups and impact physical and mental health.[40] It is important to relate activity habits to ethnicity and immigration history of families of adults and youth, and to lifestyle differences among groups and between generations. Do attitudes or perceptions of activity vary with immigration history and cultural background? How might this influence tracking of physical activity of successive generations across the lifespan?

Societal composition and values have changed over time. What is important to people? Given the present epidemic of inactivity and obesity in the American population across all ages, the values of an active lifestyle, lifelong physical activity, and associated health benefits apparently may not hold a prominent position. Determinants of a physically active lifestyle at different stages of the lifespan need more detailed consideration. Physical activity is a behavior which has several dimensions—energetic, biomechanical, motor, fitness and contextual. Physical activity is a biocultural behavior—the individual expends energy or applies ground reaction forces in movement behaviors that occur within a cultural context. It cannot be studied in a purely biological manner or in a purely cultural manner; rather, physical activity needs to be approached bioculturally.

Physical Activity and Fitness Quote

"Allowing for the different methods for estimating habitual physical activity, change associated with normal growth and maturation, and lack of control for important covariates in studies of tracking, physical activity tracks reasonably well from childhood into young adulthood. Higher interage correlations for sport participation scores in European samples suggest that more attention should be given to this context of physical activity in adolescents and young adults. Many European countries have adopted a "sport for all" theme in contrast to youth sport and interscholastic programs in the United States which become quite exclusive during adolescence. As a result sport offerings for youth with lesser skill levels or different interests are rather limited in many communities."

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